STEM2Stern

Opening Minds • Capturing the Future

CAPTURING THE FUTURE

VOL. 1 ISSUE 2

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MESSAGE FROM THE NAVAL STEM EXECUTIVE

The U.S. Navy is proud to celebrate and recognize scientific excellence that is made possible only through a diverse workforce. From Rear Adm. Grace Murray Hopper—a pioneer in the field of computer science, who played a critical role in the development of computer programming languages like COBOL—to Dr. George Carruthers of the Naval Research Laboratory, awarded the National Medal of Technology and Innovation for inventing an ultraviolet camera that significantly improved our understanding of space and earth science, the Navy and Marine Corps have benefitted from a long history of vital contributions made by scientists and engineers of every race and gender.

Within the Department of the Navy (DoN), we recognize the value of a diverse science, technology, engineering and mathematics (STEM) workforce, and are working hard to develop one that leads to greater innovation and more scientific breakthroughs for our Sailors, Marines and the nation. Yet at a time when STEM fields are increasingly important to maintaining our national security and competitiveness, it is becoming harder to find the diverse talent we need. Although we have made solid advances in recent years, we could do more in STEM fields to align ourselves with the demographics of America. Although the overall student population has become more diverse, minority groups are underrepresented among all STEM academic majors, and women are still underrepresented in many STEM fields. At the graduate level, there is an additional problem for the Department of the Navy: a declining percentage of U.S. citizens in the fields of physics, computer science and engineering, which makes it difficult to find a graduate student who is a U.S. citizen.

Promoting opportunities in STEM has become a priority for the Navy and Marine Corps. More than 50 percent of the DoN science and engineering workforce will be retirement eligible by 2020. Recruiting younger scientists and engineers is an ongoing challenge, particularly among underrepresented populations. Meeting that challenge will yield enormous benefits for our Navy and nation.

We look forward to continued partnerships with national STEM leaders and organizations as we work toward a diverse workforce of scientists and engineers. Through our STEM programs, the DoN will continue to make critical contributions to America's competitive edge and ensuring a sufficient talent pool exists to support future naval technical needs. The health of our future naval science and engineering community depends on it.

Sincerely,

Matthew L. Klunder
Rear Admiral, U.S. Navy
Chief of Naval Research
Naval STEM Executive

NAVAL STEM COMING TO THE CITY OF CHICAGO

"America has always gained strength from the background and experiences of all who make up the rich tapestry of our society. The military needs this diversity. Diversity is a fundamental building block of our success. It grants us access to differing viewpoints and problem-solving skills, keeps us grounded to the society we are part of, and is a principle the Navy and Marine Corps are committed to furthering." - Honorable Ray Mabus, Secretary of the Navy

On Feb. 15, Chicago Mayor Rahm Emanuel and Secretary of the Navy Ray Mabus announced a five-year, $2 million pilot program in STEM called Critical MASS (Midwest Association for Science and Service). Critical MASS is a unique and groundbreaking collaboration in STEM education for the students of Chicago centered on project-based learning. Through this grant, the Chicago Public Schools and City Colleges of Chicago will implement a STEM enrichment program, stretching from ninth grade through the sophomore year of college, aimed at better equipping Chicago's youth with the skills necessary to pursue STEM degrees and high-wage earning careers after completing the program.

This program will integrate a wide variety of naval-relevant STEM learning modules, career information, and internship and work-study opportunities. Critical MASS will benefit up to 1,000 students attending seven Chicago high schools via summer enrichment programs, year-round mentoring and in-classroom enrichment, as well as computer science courses through the City Colleges of Chicago to earn advanced college-level credit. This effort will provide a unique opportunity to deliver Department of the Navy programs, such as SeaPerch (an underwater robotics competition), alongside naval-relevant classroom modules and internship opportunities, allowing students to move through a continuum of programs, exposing them to naval careers, subject matter and research opportunities.

"Through this partnership, we will be able to expand opportunities for Chicago's high school students to deepen their science, technology and math skills through intensive Summer STEM Camps, year-round enrichment programs, mentorships and opportunities to earn college credit," said Mayor Rahm Emanuel during a press conference where he was joined by President Obama when the details for this effort was unveiled. "By partnering with the Navy, this program will expose students to real-world, naval-relevant STEM content and research, opening the door even wider to future career options."

NAVAL WOMEN IN STEM

This March the Department of the Navy (DoN) joined the nation in celebrating Women's History Month by highlighting the achievements of its female service members. Today, more than 54,000 active-duty women and more than 10,000 female Reservists are serving in the Navy, comprising 17 percent of the force. These numbers have steadily increased since the establishment of the Navy Nurse Corps in 1908, which was comprised of 20 female nurses called the "Sacred Twenty."

This year the celebration of Women's History Month was themed "Women Inspiring Innovation Through Imagination: Celebrating Women in Science, Technology, Engineering and Mathematics." This theme called out the critical contributions women have made in the fields of mathematics and the sciences, and it reminds us of the compelling need to develop the next generation of female scientists and engineers, particularly within DoN.

Currently, women hold 15 percent of DoN civilian STEM jobs and make up 20 percent of the cyber-related personnel comprising the Information Dominance Corps (officer and enlisted). While these numbers are consistent with the larger U.S. STEM workforce, the DoN is committed to increasing the number of young women who fulfill their dreams in STEM.

STEM OUTREACH DAY AT NAVAIR

As part of Science and Engineering Week, Naval Air Warfare Center Training Systems Division (NAWCTSD) hosted five local central Florida high schools at its facility during Outreach Day. Students were invited to speak about their experiences with FIRST Robotics and to tour several labs. FIRST Tech Challenge (FTC) teams from University High School in Orlando, Fla., demonstrated their robots to NAWCTSD employees. "Stay involved with the STEM program," said Executive Officer Capt. Wes Naylor as he encouraged students to remain motivated about their education goals, "Stay involved with this discipline. If engineering was easy then everyone would do it."

Capt. Wes Naylor Speaks to Local Robotics Teams

The all-girls team, Team Fetch, showed their YouTube video depicting their journey to the FTC Florida Championship and also provided an entertaining rap performance about their team. The boy's team, Robo GT, played their video about designing, building and programming their robot. Merritt Island and Cocoa High Schools' FIRST Robotics Competition teams, Horsepower and Bionic Tigers, combined to demonstrate one of their robots, "Thing Two," which competes by attempting to launch a basketball into a hoop.

After the demonstrations, the students toured four NAWCTSD labs: the Conning Officer Virtual Environment, Weapons Launch Console Team Trainer, Technology Integration Facility/Dome Room and Weapons Simulation & Integration Lab.

TECHNOVATION CHALLENGE GETS GIRLS EXCITED ABOUT INFORMATION TECHNOLOGY

Technovation Challenge nurtures a diverse talent pipeline by helping young women overcome barriers that preclude them from considering technology careers. Middle and high school girls partner with women in technology to develop apps that solve problems in their communities. In three seasons, 800 girls created 163 original mobile phone apps. Technovation has expanded to an online platform and is expecting 500 girls worldwide to participate in 2013.

Technovation Expanding Worldwide in 2013

One exciting development this school year came when the Denver School of Science and Technology (DSST) Cole Middle School began offering Technovation for credit to 35 sixth and seventh graders. DSST Cole serves a student population made up of 77 percent minority and 76 percent eligible for free/reduced lunch. Students are completing Massachusetts Institute of Technology (MIT) App Inventor tutorials, building apps and crafting business plans. The community problems the teams are working on include animal neglect and abuse, bullying, girls' self-esteem, studying and recycling. According to their teacher, girls are learning how to move through the design process from ideation to implementation.

On May 2, 10 winning teams from 24 U.S. states and territories and 18 countries traveled to San Francisco for the Technovation World Pitch event, co-hosted by Twitter and LinkedIn. The winning team received $10,000 to take their winning app concept to market. Congratulations to Team Arrive from the Nightingale-Bamford School, New York City.

CYBERSECURITY EFFORTS IN SOUTH CAROLINA

Space and Naval Warfare Systems Command Systems Center (SSC) Atlantic's outreach goal to inspire students to take on roles in cyber-related fields so they can make a difference in the security, stability and functional agility of national and global information is being realized with the development of cybersecurity curricula and clubs. A Cyber Security Syllabi team from SSC Atlantic helped develop two high school cybersecurity class curriculums to create a future cybersecurity workforce in South Carolina. This team won SSC Atlantic's STEM Outreach of the Year award last year for their efforts. The two courses - Cyber Security Foundations and Advanced Cyber Security - were recently adopted in South Carolina's Career and Technology Education program, and North Charleston's Lowcountry Technical Academy will be the first in the state to host the classes. The team's hard work, more than 500 hours last year, continues as the volunteers are helping to fine-tune lesson plans and lab exercises, and are working on a collaborative suite to develop hybrid classes to reach out to the rest of state.

The team has also helped establish cybersecurity clubs at six local high schools. "We go to schools once a week and talk to students about cybersecurity and run through various security exercises," team member and Cyber Forensics Lead Bill Littleton said. The exercises are to prepare students for the upcoming Palmetto Cyber Defense Competition, April 13 and 14, at The Citadel, the Air Force's Cyber Patriot Competition and the DC3 Digital Forensics Challenge.

William "Bill" Littleton, right, describing the networking layers of the OSI Model.

The competitions, pitting Red hacker teams against Blue defender teams, allow students to practice cybersecurity in a safe, yet challenging environment. They provide a training ground for students to develop and demonstrate cybersecurity skills through team cyber exercises and at the same time help enlist a new generation of cybersecurity professionals.

CITY OUTREACH OFFICES DIVE INTO SEAPERCH

During the 2012-2013 school year, the New York and Los Angeles Navy City Outreach Offices have embraced one of the Navy's signature programs, SeaPerch. In both New York and LA, SeaPerch was introduced to teachers and school districts and outreach coordinators guided students through the build season.

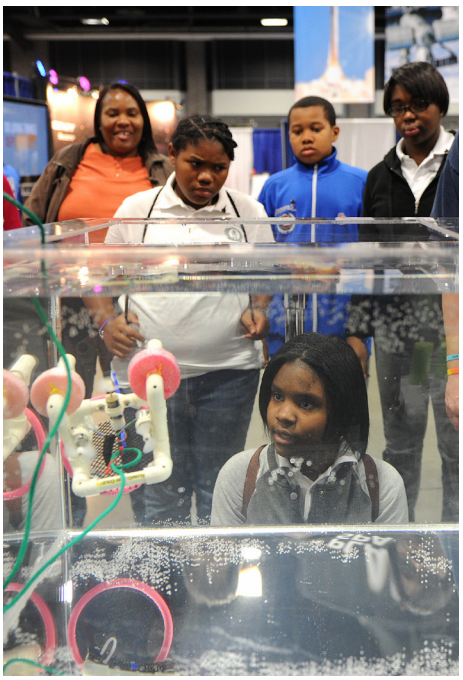
In New York City, this 6-month effort culminated with a SeaPerch Challenge at City College of New York in Harlem on March 23. A crowd of 250 mostly inner city students, parents and teachers attended the event. The students followed the SeaPerch curriculum throughout the school year so that their vessel was fit to serve in the Navy. "The most significant factor of this event was the fact it ran almost an entire school year. I did not want this to be a fly-by program where we show up for a few hours and create a fleeting memory," remarked Lt. Cmdr Michael Fourte the New York City, Navy City Outreach officer.

Remotely Operated Vehicle (ROV) demonstration.

Many of the elements of the Department of the Navy participated in the event. From Navy Seal Team 10, who taught students about some of the technical aspects of diving and diving equipment, to the Naval Submarining School Silver Dolphins Silent Drill Team who performed, to the 15 Selected Reserve sailors from the Navy Operational Support Center and the SeaBees, who built the obstacle course.

Heading up the SeaPerch LA effort is Lt. Cmdr Anthony Tran. He coordinated a session to bring industry partners and engineering students from local colleges together for SeaPerch Mentor training. The event, hosted by the University of Southern California/ROTC Unit, was a follow up to the Teacher Training held in November to kick off the SeaPerch Los Angeles Program. SPAWAR San Diego, USC/ROTC Science Department, and ONR/SeaPerch partner Iridescent, were present to assist. The highlight of the two-day event was the launching of the SeaPerch robots in the community pool where the student teams showcased and maneuvered their robot.

The Los Angeles SeaPerch Challenge is slated for June 8 aboard the USS IOWA, where more than 20 schools and between 200-300 students are expected to attend.



New York City students maneuvering mini SeaPerch.

STUDENT SPOTLIGHT:

Gina Tierno

Former SEAP and NREIP Student

Gina Tierno, who worked during the summer of 2012 with Life Support and Compressed Air Systems Branch as a Naval Research Enterprise Internship Program (NREIP) student, is the president of the new American Society of Naval Engineers (ASNE) Rowan University chapter. Gina, who is already considering getting a master's degree in systems engineering and would like to be a branch head at the Naval Surface Warfare Center, Carderock Division, Ship Systems Engineering Station (NSWCCD-SSES) one day, worked with junior mechanical engineering major Andreas Gabrielsen to start ASNE Rowan. They were assisted by NSWCCD-SSES employees Patrick Violante and Scott Storms, both with the Advanced Machinery Systems Integration Branch.

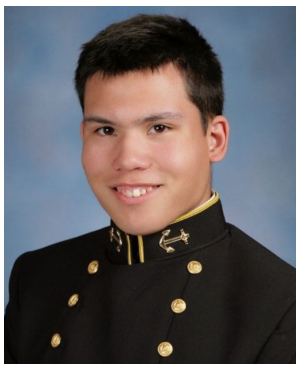
"Establishing this chapter is a really good way to get involved with students and introduce them to naval engineering," said Violante, a 2003 Rowan graduate in electrical engineering. "They can see what we do and learn how their engineering training can be applied to our work at NSWCCD-SSES." Tierno filed the appropriate paperwork with the university and drafted the chapter's constitution. "My goal for this chapter is networking," said Tierno, a chemical engineering major. "I want to connect students with naval engineers so they can see that naval engineering encompasses all engineering disciplines. I also want to educate students about working for the government, in particular the Department of Defense."

Tierno's introduction to naval engineering came before starting college as a Science and Engineering Apprenticeship Program (SEAP) student at NSWCCD-SSES. She followed that by participating in the NREIP after her freshman year, working for th Life Support and Compressed Air Systems Branch. "She really spearheaded the effort to establish the club," said Violante. "She's very inquisitive, a real go-getter, and great organizational leader."

Courtesy of: Joseph Battista, NSWCCD-SSES Public Affairs

Jon Williams

USNA Midshipman



Jon Williams of Company 26 is a U.S. Naval Academy (USNA) midshipman from Hyattsville, Maryland. Williams serves as president of MSTEM and was one of four midshipmen who travelled to Tulsa, Okla. to train and assist local teachers in a SeaPerch build and competition. The USNA representatives, including Professors Gwen Gray, Beth Mutch and Angela Moran, interacted with 50 teachers and 60 students from underrepresented schools through an agreement with the Tulsa Alliance for Engineering. A physics and math major, Williams has participated in SeaPerch trainings and competitions, the USA Science and Engineering Festival, the Astronaut Convocation and Candidate Visit Panel Discussions. "The USA Science and Engineering Festival was my favorite event because our STEM booth had some fun activities, and there was a bunch of other exciting things to do and well-known people there like the Mythbusters and Bill Nye the Science Guy," said Williams. "STEM has been a fun way to pass on my knowledge to others and inspire them to learn more."

Left to right : Dale Fleury (NMSI), Brice Wiggins (state senator), Dr. William Lee (school board member), Melissa Smith (school board member), Dr. Bonita Coleman-Potter (Superintendent, Ocean Springs School District), Dr. Joe Calantoni (NRL), David Baggett (principal), Sue White (school board member), Dr. Lena Melton (school board member), and Timothy Taranto (school board member), and Michael Watson (state senator)

NATIONAL MATH AND SCIENCE INITIATIVE (NMSI) ADDS TWO MISSISSIPPI HIGH SCHOOLS

As part of its partnership with the Department of the Navy, NMSI is expanding its Advanced Placement (AP) Program for military families into two Mississippi schools. Earlier this year, a special event was held at Ocean Springs High School in Mississippi to announce the expansion of the NMSI AP Program to Ocean Springs High School and Biloxi High School. This highly successful program will launch in fall 2013 and serve families stationed near Biloxi, Miss.

NATIONAL MATH + SCIENCE INITIATIVE

"This innovative program can open doors to college for more students and give them skills they will need to not just be in position to find good jobs in fields such as engineering and technology, but to have successful and rewarding careers," said Gregg Fleisher, chief program officer for NMSI. This expansion will bring the total of number of schools implementing the NMSI program for military families to 54 schools in 15 states. The grant from the Department of the Navy currently supports five of these schools, two in Hampton Roads, Va., one in Mililani Town, Hawaii and now these two schools in Mississippi. Although this program specifically targets schools serving military dependents, it is open to all students in participating high schools who are eligible for AP classes. Program components include study sessions outside of normal school hours, as well as intense training for the AP teachers and teachers in grades 6-12 who will build the pipeline of students who are AP-ready. College Board results for high schools participating in the military families program during the 2011-12 school term showed an increase in AP math and science scores of 85 percent.

After just one year, the Navy's investment is showing results. Green Run and Salem High Schools in Hampton Roads, Va. have seen the following impact:

- A 64 percent increase in passing scores for the AP math, science and English exams - 9 times the national average
- An 81 percent increase in passing scores by African-American and Hispanic students
- A 113 percent increase in passing scores by female students

STEM TEAM BUILDING AND CAREER DAY

The Marine Corps Systems Command (MCSC) has plans underway for a one day STEM team-building and career day for Quantico Middle / High School students. On May 9, 2013, teachers, MCSC engineers, Naval Surface Warfare Center (NSWC) Dahlgren engineers and engineering students from Virginia Tech will be teaming to provide hands-on demos, career briefings and team-building exercises. Students will be rotated through three segments, including a talk about engineering career fields, static displays and interactive demos, and a spaghetti tower team exercise. Gen. Frank Kelley, commander, MCSC, will be giving a keynote address in the morning to kick off activities.

ONR'S STEM BAA

Through its Broad Agency Announcement (BAA), the Office of Naval Research (ONR) is interested in receiving proposals for developing innovative solutions that directly support the development and maintenance of a robust Naval STEM workforce. Successful efforts will be targeted towards one or more of the following: K-12, Undergraduate, Graduate STEM education and metrics and evaluation. The goal of any proposed effort should be to provide "game changing" solutions that will establish and maintain a diverse pipeline of U.S. citizens who are interested in participating in Naval STEM education programs and who ultimately will be interested in Naval STEM careers.

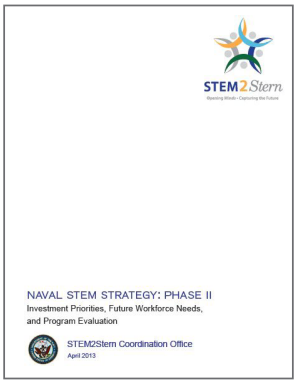
Full Proposals will be accepted until September 30, 2013 05:00 PM EST. White Papers due no later than September 30, 2013 05:00 PM EST.

STEMtistics

- **STEM occupations** are projected to **grow by 17 percent** from 2008 to 2018, compared to 9.8 percent growth for non-STEM occupations.
- **Seven out of ten STEM workers are non-Hispanic whites**, which aligns closely with their share of the overall workforce.
- **Women's participation** and degree pursuit in engineering and computer sciences remains **below 30 percent**.
- Although women fill close to half of all jobs in the U.S. economy, they hold **less than 25 percent of STEM jobs**.
- **638 high school and college students** have been selected to participate in this summer's naval research internship program at 29 different Naval Sites.

PHASE II REPORT

In March, Secretary of the Navy Ray Mabus released his 2013 Naval Science, Technology, Engineering and Mathematics (STEM) goals as part of the Naval STEM Strategy: Phase II report. Mabus's 2013 goals renew his commitment to STEM, calling for an increase in internship programs, a focus on military families and the creation of programs aimed at reflecting the STEM workforce skills and needs of the future. In addition, Phase II highlights three priorities - implementing the 2011 STEM Roadmap, conducting a naval STEM workforce analysis and developing a comprehensive metrics and evaluation plan for the naval STEM program. Copies of the report can be found on the STEM2Stern website at: http://www.stem2stern.org/phase2strategy



Left to right: Chevanne Binns-Wallace, SeaPerch Executive Director Susan Nelson, and Keyan Wills.

Chevanne and Keyan were invited to present their SeaPerch to the President and other VIP's at the White House Science Fair held on April 22, 2013. Binns-Wallace led his SeaPerch team to victory in a Baltimore-based competition last year, despite a brief hospitalization. SeaPerch, an educational program funded by ONR, is an underwater robotics program used by teachers to demonstrate the principles of robotics to K-12 students.

ABOUT STEM2STERN

STEM2Stern is the Department of the Navy's Science, Technology, Engineering and Mathematics (STEM) Initiative. Under the leadership of the Chief of Naval Research, who serves as the Naval STEM Executive, STEM2Stern works with the naval system commands, laboratories, warfare centers and other research and education institutions to leverage resources and maximize the impact of the department's STEM investments.

These investments support a wide variety of STEM educational programs, ranging from activities designed to spark younger students' interest in STEM careers, to more in-depth, hands-on learning opportunities for middle and high school students, internships and research fellowships for older high school and post-secondary students and professional development opportunities for naval STEM professionals and faculty.

STEM2Stern.org provides information about STEM projects sponsored by the U.S. Navy. This includes recent news about the programs, as well as specific program descriptions and success stories.

The website allows users to search for projects by participant location, grade or program type or by typing in the name of the program. The information provided to the general public includes a brief program description, location, activity duration and a public email contact. We encourage you to visit STEM2Stern.org to learn more!

STEM BIO

Cmdr. Joseph Cohn, Ph.D. is an aerospace experimental psychologist in the U.S. Navy's Medical Service Corps. He is currently the Office of Naval Research's Deputy Director of Research, for Science, Technology, Engineering and Mathematics. Cohn's past efforts focused on developing and transitioning advanced performance-enhancing technologies with an emphasis on adaptive training and education capabilities.

Carolyn Van Damme is the founder of the Round Peg Group. As a support contractor, she serves as the STEM Advisor to the Naval STEM Coordination Office, located at the Office of Naval Research. She has a long history of developing and working with STEM education programs, most notably FIRST Robotics. She is a STEM professional with over 20 years experience working within the high tech industry, research universities and education not-for-profits.

To contact our office directly, send emails to info@stem2stern.org.

STEM2Stern
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Office of Naval Research
ONR
Science & Technology

STEM EVENTS

BHEF STEM Modeling Summit
June 10, 2013
Washington, D.C.
www.bhef.com

NAVAL STEM WEBSITES AND SPONSORED ACTIVITIES

Below is a list of websites that may be of interest to this community. It includes web addresses for various Naval programs, as well as some of our signature program partners.

www.STEM2Stern.org
www.usna.edu/STEM
www.seaperch.org
www.iridescentlearning.org
www.gooru.org
www.ndep.us
www.asee.org/SEAP
www.asee.org/NREIP
www.asee.org/SMART
www.nmsi.org
www.dodstarbase.org
www.usfirst.org

WWW.STEM2STERN.ORG